

DISTRIBUTION OF  
*PODOSTEMUM CERATOPHYLLUM*  
MICHX. (PODOSTEMACEAE)<sup>1</sup>

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ABSTRACT

*Podostemum ceratophyllum* is an often overlooked freshwater dicot, restricted to areas of swift moving river currents—an apparently ecologically sensitive habitat. Selected specimens representing the entire range of the plant are listed.

*Podostemum ceratophyllum* (Riverweed), a freshwater aquatic dicot, grows attached to rocks in river rapids and waterfalls. The plant tends to be undercollected because of its often inaccessible habitat and inconspicuous appearance (often mistaken for an aquatic moss or freshwater alga) (Philbrick, 1981, 1982). Consequently, its current distribution is unclear. The purpose of this paper is to provide a distributional record of *P. ceratophyllum* based on specimens from 41 herbaria.

*Podostemum ceratophyllum* is the single North American member of an otherwise tropical family, Podostemaceae. *Podostemum ceratophyllum* exhibits the widest distribution of any species in the genus, ranging from central Nova Scotia, central New Brunswick and southern Quebec, southward along the eastern United States to Georgia, and westward to Kentucky and eastern Oklahoma (Fig. 1). Raymond (1950) reports a location in eastern Wisconsin but we have not seen a specimen that documents this site. The species is also represented in the West Indies (Dominican Republic) and in Central America (Honduras, as var. *circumvallatum*), although very few specimens document this southernmost portion of its range. The remaining 16 or so species in the genus occur in the southern hemisphere from southern Brazil south to Argentina and Paraguay (Royen, 1954). There are also species reported from Africa and India, but their position in this genus is uncertain (Graham & Wood, 1975; Royen, 1954; Willis, 1902).

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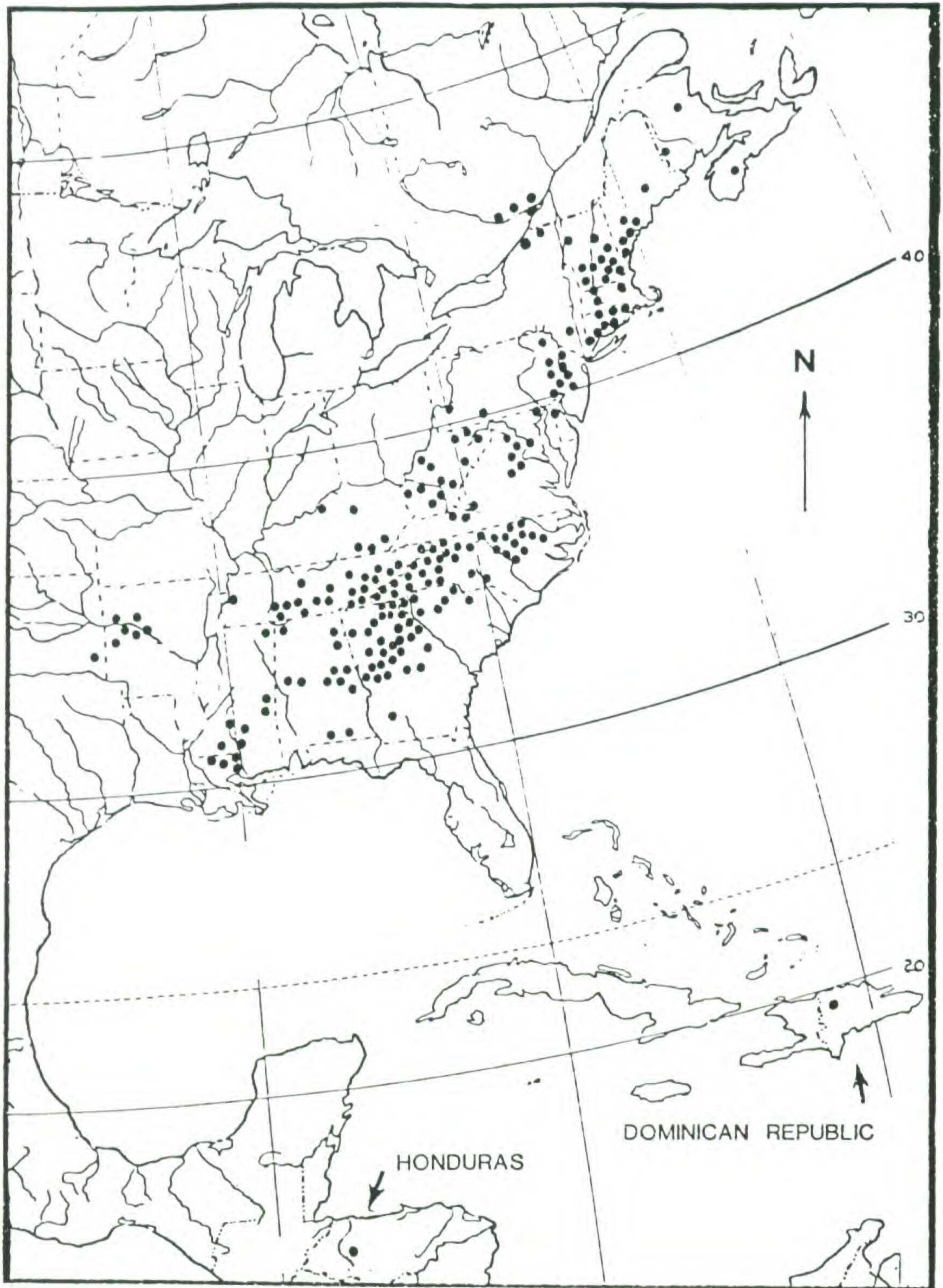


Figure 1. Distribution of *Podostemum ceratophyllum*.

The lack of documentation of *Podostemum ceratophyllum* was briefly discussed by Muenscher and Maguire (1931) for New York. It has recently been accessed as rare in New England (Crow et al., 1981). However, during the summer of 1981 numerous previously unknown stations for the plant were documented in southern New Hampshire and southern Maine (Philbrick, 1982). This suggests that the plant is much more common in this region than previously believed. On the other hand, while many locations for *Podostemum* have been documented in New England since the late 1800's, several of the earlier known stations no longer harbour the plant. The plant has not been collected from the first known New England station (Killingworth, Conn.) since 1925, and Countryman (1978) reported its absence at Jamaica, the earliest known Vermont site. Recent searches of Rhode Island stations were unsuccessful in finding the plant.

In many respects the habitat of *Podostemum ceratophyllum* is ecologically harsh, as illustrated by the fact that there are virtually no angiosperms with which *Podostemum* must compete for growing space. Several species of *Potamogeton*, however, occasionally grow in the gravel between the rocks on which *Podostemum* is attached. This habitat also seems ecologically sensitive. Any manipulation of this environment resulting in substratum modification, water flow changes, or deterioration of water quality could result in the death of the plant. Drastic changes in water flow seem to be the most obvious cause of extirpation of the plant. Countryman (1978) reports that the West River population at Jamaica, Vermont, seems to have been extirpated due to river flow manipulation. It is also believed that one of the two documented New Brunswick, Canada, locations is currently inundated to a depth that prevents growth (H. Hinds, pers. comm).

Water pollution and siltation may also have drastic negative effects on *P. ceratophyllum*. Such factors may have resulted in its loss from a location in the Cocheco River at Dover, New Hampshire. Although numerous specimens document the site, we could not locate any plants during 1980–1982. Its apparent disappearance may be related to a mass fish-kill in the Cocheco River. This fish-kill is reported to have been linked to industrial waste dumping in July of 1973, several miles upstream from the *Podostemum* population (Thayer, 1973, unpublished).

Although *Podostemum* is, no doubt, sensitive to specific pollutants, all pollutants are not detrimental to the species. The first author has collected the plant from the Mousam River, Kennebunk, Maine, where the river is noticeably polluted by domestic sewage. The Winooski River in South Burlington, Vermont, is also polluted (W. Countryman, pers. comm.) but the plant grows well. It is therefore apparent that the plant is not as good an indicator of clean water as Meijer (1976) proposed.

#### ACKNOWLEDGEMENTS

We thank Thomas D. Lee and Debra A. Dunlop for their comments on the manuscript, and the curators of the herbaria listed below for allowing us to examine their specimens of *Podostemum ceratophyllum*. We also thank Alex Wilson for providing specimens of the previously unreported Nova Scotia population.

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APPENDIX: REPRESENTATIVE SPECIMENS

The following locality information is based on specimens from ACAD, APSU, CM, CLEMS, CONN, DUKE, F, FLAS, GA, GH, HNH, LAF, MAINE, MASS, MICH, MIN, MO, NCSC, NCU, NEBC, NHA, NLU, NO, NSPM, NY, OS, OKLA, PH, SMU, TENN, UARK, UNA, US, USF, VDB, VPI, VT, WIS, WVA, Tennessee Valley Authority collection (TVA), and Western Kentucky University (WKU). For simplicity most fractional units have been changed to decimal.

CANADA. NEW BRUNSWICK. **Northumberland Co.:** Quarryville, *Webster and Fielding 225* (1955) (ACAD, NSPM); near Woodstock, Eel River, *Macoun 22593* (1899) (CA, F). NOVA SCOTIA. **Lunenburg Co.:** LaHave River, *Wilson and Wright, s.n.* (1982) (NHA, NSPM).

ONTARIO. **Hastings Co.:** Actinolite, Skoutamata River, *Catling, s.n.* (1977) (OS); vicinity of Ottawa, Brighams Creek, *Macoun 5907* (1898) (F).

QUEBEC. **Argenteuil Co.:** opposite Hawkesburg, *Dore 18641* (1960) (LAF, NHA). **Deuxmontagnes Co.:** Ile Yale, Mille Iles River, *Marie-Victorin, Gervais and Lavigne, s.n.* (1969) (US); Ile Bizard, *Marie-Victorin 22081* (1925) (MO, WIS, PH, MIN, F. ACAD); St. Eustache, *Victorin 3212* (1916) (MO, NY, US). **Gatineau Co.:** Hull, *Macoun, s.n.* (1894) (MO, MICH, NY, MIN); Hull, Ottawa River, *Moyle, s.n.* (1959) (MIN). **Vaudreuil Co.:** Ile Perrot, *Cody and Dore 6565* (1952) (PH, MAINE, WIS, MICH, US, NY); Ile Des Pins, Vaudreuil, *Marie-Victorin, s.n.* (1960) (US).

UNITED STATES. ALABAMA. **Bibb Co.:** SW of West Blockton, Little Cahaba River, *Haynes 7462* (1979) (UNA). **Cherokee Co.:** Centre, Terrapin Creek, *Kral 31759* (1968) (OS, SMU, VDB); Ellisville,

Terrapin Creek, *Haynes 7329* (1979) (UNA). **Clay Co.:** Lineville, Crooked Creek, *Haynes 7372* (1979) (UNA, VDB). **Coosa Co.:** SW of Rockford, Swamp Creek, *Haynes 7904* (1980) (UNA). **Covington Co.:** "the shoals", Patsaliga Creek, *Harper 106* (1906) (GH, MO, NY, US). **De Kalb Co.:** Little River, *Wiersema 376* (1978) (UNA); NW of Gaylesville, Little River, *Haynes 6587* (1978) (UNA); 1 mi. W of junction with Little River, Hicks Creek, *Clark and Landers 5101* (1966) (NCU); Lake Guntersville State Park, Town Creek, *Meigs 930* (1980) (UNA). **Geneva Co.:** 5 mi. SW of Coffee Springs, Double Bridges Creek, *McDaniel 8566* (1967) (VDB). **Lauderdale Co.:** Florence, Cypress Creek, *Snoddy, s.n.* (1978) (TVA); N of Florence, Little Cypress Creek, *Haynes 6784* (1978) (UNA, VDB); Pruitton, Butler Creek, *Harper 3870* (1942) (F, GH, PH, US, WIS); Mussell Shoals, Tennessee River, *Harper, s.n.* (1922) (NY, PH, US). **Lee Co.:** near Bean's Mill, Halawakee Creek, *Wiersema 831* (1979) (UNA); Chewacla State Park, Chewacla Creek, *Johnson 51* (1959) (NCU); Wright's Mill, Little Uchee Creek, *Haynes 7858* (1980) (UNA). **Marshall Co.:** 4.5 mi. SSE of Lake Guntersville State Park, Short Creek, *Webb 3005* (1980) (TVA). **Randolph Co.:** Wadly, Tallapoosa River, *Haynes 7354* (1979) (UNA). **Tallapoosa Co.:** N of Reeltown, Songahatchee Creek, *Haynes 7879* (1980) (UNA); Samantha, North River, *Davenport 1204* (1979) (UNA, VDB); Alexander City, Elkahatchie Creek, *Kral 43308* (1971) (VDB).

ARKANSAS. **Conway Co.:** Petit Jean State Park, Cedar Creek, *Morrilton 722* (1955) (TENN, UARK). **Franklin Co.:** Taft, Mulberry Creek, *Moore, s.n.* (1952) (UARK). **Montgomery Co.:** Caddo Gap, Caddo River, *Moore 54-111* (1954) (F, TENN, UARK, WIS); Pine Ridge, Ouachita River, *Harris, Basco and Douglas, s.n.* (1977) (NLU). **Pope Co.:** Ozark National Forest, Big Pingy Creek, *Hamilton 41* (1969) (NCU); Dover, Twin Bridges, *Tucker 5791* (1967) (NCU); Cossatut Creek, *Moore 510673* (1951) (UARK). **Van Buren Co.:** Shirley, Little Red River, *Clark 92b* (1971) (UARK).

CONNECTICUT. **Fairfield Co.:** Bridgeport, Pequomock River, *Eames 9519* (1917) (CONN, NEBC); Fairfield, Mill River, *Eames and Godfrey 5296* (1906) (CONN, MIN); Huntington, Farmill River, *Eames 5290* (1905) (CONN, MIN); Newtown, *Nichols, s.n.* (1979) (NEBC); Trumbull, Pequonnock River, *Eames 11722* (1935) (CONN, GH). **Hartford Co.:** Windsor, "Rainbow", *Clark, s.n.* (1904) (CONN). **Middlesex Co.:** Killingworth, [Hammonasset River], *Hall, s.n.*

(1874) (CONN, NEBC); East Haddam, Devil's Hopyard, *Eames, s.n.* (1933) (CONN). **New Haven Co.:** Oxford, Little River, *Harger 2356* (1902) (CONN, GH). **Tolland Co.:** Mansfield, Mt. Hope River, *Macgregor and Torrey 4391* (1948) (CONN (2)); Mansfield, Willimantic River, *Torrey 4410* (1948) (CONN (3)). **Windham Co.:** South Chaplin, Natchaug River, *Heisey, s.n.* (1974) (CONN); Canterbury, Little River, *Goldstein 101* (1974) (CONN).

DELAWARE. **New Castle Co.:** Wilmington, Brandywine Creek, *Canby, s.n.* (1883) (MASS); Faukland, Red Clay Creek, *Commons, s.n.* (1886) (CM, USF); Greenbank, Red Clay Creek, *Commons, s.n.* (1884) (MO, NY (2), PH US).

GEORGIA. **Cherokee Co.:** SW of Canton near Cherokee Mills, Little River, *Duncan 8336* (1948) (GA). **Clarke Co.:** SW of Athens, Bobbin Mill Creek, *Pyron and McVaugh 78* (1935) (NO); Tallassee Shoals, *Pyron, s.n.* (1935) (CLEMS, GA). **Dawson Co.:** Dawsonville, Amicalola Creek, *Pyron and McVaugh 1006* (1936) (GA). **Dougherty Co.:** Albany, Flint River, *Chapman, s.n.* (unknown date) (NY); Muckafoonee Creek, *Harper 1950* (1903) (F, GH, MO, NY, US). **Elbert Co.:** NW of Elberton, Broad River, *Duncan 11714* (1950) (GA, GH, NCSC); Ga. Highway 172, Broad River, *Coile and Bates 1994* (1978) (FLAS, NCU). **Floyd Co.:** Rome, Coosa River, *Chapman, s.n.* (1937) (F, MO, US). **Fulton Co.:** SE of Roswell, Chattahoochee River, *Duncan and Venard 16522* (1953) (GA, NCSC); NW of Norcross, Chattahoochee River, *Welch, s.n.* (1965) (CM, GA). **Gilmer Co.:** Doll Mountain public access area, Coosawattee River, *Kral 50866* (1973) (VDB). **Gwinnett Co.:** 1 mi. below Old Jones Bridge, Norcross, *Huisch, s.n.* (1964) (GA). **Habersham Co.:** Soque River, *Nee, Peet and Arnold 1748* (1969) (WIS); S of Clayton, Tallulah River Gorge, *Michener 1430* (1975) (NCU). **Harris Co.:** N of Fortson, *Duncan 9248b* (1949) (GA); Robert Lewis Scout Camp, Mulberry Creek, *Jones 21868* (1972) (NCU). **Hart Co.:** NW of Hartwell, Shoal Creek, *Duncan 7821* (1947) (GA). **Jones Co.:** E of James, Altamaha River, *Suttkus 2518* (1955) (MO, NO); Highway 22, Commissioner Creek, *Musselman 4402* (1972) (NCU). **Madison Co.:** S of Carlton, Andrew's Shoals, south fork of Broad River, *Scott, s.n.* (unknown date) (GA, GH, MO); Comer, *Pyron, s.n.* (1934) (DUKE). **Madison-Oglethorpe Co. Line:** S of Carlton, south fork of Broad River, *Suttkus, s.n.* (1953) (DUKE, NCU (2), NO, NLU). **McDuffie Co.:** Rt. 79, Little River, *Leeds, s.n.* (1933) (PH). **Meriwether Co.:** Flat Shoals,

Flint River, *W.A.J. and B.B.H., s.n.* (1938) (GA, LAF, NCU, NLU, WVA). **Morgan Co.:** Farmington, Double Shoals, Appalachia River, *Jones 21012* (1971) (GA). **Newton Co.:** Covington, Bear Creek, *Rogers, s.n.* (1963) (GA). **Oglethorpe Co.:** Lexington, Echols Mill, *Montgomery 933* (1967) (DUKE, F, FLAS, GA, LAF, MASS, MO, NCU, NCSC, NLU, NO, NY (2), PH, TENN, UNA (2), USF, VDB, WVA); Comer, south Broad River, *Pyron and McVaugh 41* (1935) (DUKE, F, GH, MO, PH (2)); Carlton, Andrew's Mill, south fork Broad River, *Duncan 11647* (1950) (DUKE, FLAS, GH, MICH, MIN (2), MO, NCSC, SMU, TENN, UNA, US). **Pike-Meriwether Co. Line:** W of Concord, Flint River, *Pyron and McVaugh 1831* (1937) (GA). **Rabun Co.:** base of Big Mountain, Chattooga River, *DuMond 1189* (1968) (NCSC, WKU); WSW of town of Pine Mountain, *Suttkus 2531* (1955) (GA, LAF, NO). **Rockdale Co.:** Logansville, Haynes Creek, *Pyron and McVaugh 552* (1936) (MICH, US). **Stevens Co.:** 1 mi. upstream from confluence with Tugaloo River, Panther Creek, *Boufford, Massey and Katz 16988* (1975) (NCU); N of Toccoa, Cedar Creek, *Boufford and Wood 16799* (1976) (NCU); S of Toccoa, Broad River, *Scott 91* (1949) (GA). **Talbot Co.:** ENE of Manchester, Flint River, *Jones 21098* (1971) (GA). **Towns Co.:** W of Hiawassee, Hiawassee River, *Wherry and Pennell 14075* (1927) (PH); Hiawassee, Center Creek, *Scott, s.n.* (unknown date) (GA). **Upson Co.:** 3 mi. W of Thomaston, Potatoe Creek, *McVaugh 8939* (1948) (MICH, MO, NLU, NCU, SMU, VDB); SE of Woodbury, Flint River Gorge of Pine Mountain, *Jones and Faust 22036* (1972) (DUKE, GA). **Walton Co.:** Athens, Apalachee River, *Pyron and McVaugh 66* (1935) (GA). **White Co.:** E of Helen, *Duncan 20778* (1958) (GA).

KENTUCKY. **Fayette Co.:** Kentucky River, *Peter, s.n.* (1833) (MICH, MASS). **Harlan Co.:** near Harlan Court House, *Kearney 19* (1893) (GH, MIN, US). **Jefferson Co.:** Falls of Ohio River, *Short, s.n.* ("1840") (NY (3), PH). **McCreary Co.:** Tennessee-Kentucky Line, big south fork of Cumberland River, *Wofford 78-99* (1978) (TENN). **Menifee-Wolfe Co. Line:** E of Gladie Creek, Red River, *Meijer, s.n.* (1974) (WKU). **Whitley Co.:** Cumberland Falls, Cumberland River, *McFarland 95* (1940) (DUKE, GA, GH, MICH, MIN (2), MO, NHA, NY, PH, TENN, US, WVA). **Whitley-McCreary Co. Line:** Cumberland Falls, *Braun 2633* (1939) (US, WIS).

LOUISIANA. **St. Helena Parish:** NE of Montpelier, Tickfaw River, *Allen 1923* (1972) (LSU). **St. Tammany Parish:** NW of Covington,



Bogue Falaya, *Thieret 27013* (1967) (DUKE, GH, LAF, VDB). **Tangipahoa Parish:** Amite River, *Cooley and Brass 4183* (1955) (USF); E of Independence, Tangipahoa River, *Thomas 40377* (1974) (CM, FLAS, GA, MASS, MO, NCU, NLU, PH). **Washington Parish:** W of Warnerton, Pearl River, *Suttkus 2770* (1959) (NO); SW of Franklinton, Bogue Chitto River, *Thieret 29307* (1968) (DUKE, FLAS, GA, NCU, SMU).

MARYLAND. **Baltimore Co.:** unknown locality, *Shreve, s.n.* (1902) (MIN). **Cecil Co.:** ESE of Pilot, Conowingo Creek, *Wilkins 6855* (1941) (NCU, PH). **Garrett Co.:** Deep Creek, *Drouet 2346* (1938) (F); Swallow Falls State Forest, Muddy Creek, 8 mi. NNW of Oakland, *Herman 14915* (1958) (US); Savage Station, *Williamson, s.n.* (1905) (PH (3)). **Howard Co.:** Savage Station, Patuxent River, *House 1521* (1905) (MO). **Prince Georges Co.:** NW of Bowie, Patuxent River, *Hermann 9940* (1938) (F, NY).

MAINE. **Cumberland Co.:** Yarmouth, Royal River, *Philbrick 1136* (1981) (NHA). **Cumberland-Sagadahoc Co. Line:** Brunswick-Topsham line, Androscoggin River, *Philbrick 1135* (1981) (NHA). **Kennebec Co.:** Benton Village, Sebasticook River, *Rossbach 4965* (1959) (MAINE, NCU); Clinton, Sebasticook River, *Rossbach 5029* (1959) (MAINE (4), NCU); West Gardiner, Collin's Dam, *Fassett 18295* (1936) (F, GH, MAINE, MIN, MO, NEBC, NY). **Lincoln Co.:** Alna, Sheepscott River, *Philbrick 1113* (1981) (NHA); Cooper's Mills, Sheepscott River, *Philbrick 1117* (1981) (NHA); Whitefield, Sheepscott River, *Philbrick 1115* (1981) (NHA). **Penobscot Co.:** Alton, Pushaw Stream, *Steinmetz 1188* (1942) (MAINE); Bradley, Chemo Stream, *Merrill 861* (1898) (US); Old Town, Gilman Falls, *Steinmetz and Ogden 840* (1937) (CONN, F, GH, MAINE, MASS, MICH, MO, NCSC, NCU (2), NEBC, NY, OKLA, PH (2), SMU, US, VT, WIS, WVA); Old Town, Gilman Falls, *Bicknell, s.n.* (1952) (MAINE); Orono, Pushaw Stream and Stillwater River, *Steinmetz, s.n.* (1939) (PH, (2)). **York Co.:** Kennebunk, Mousam River, *Philbrick 1137* (1981) (NHA); Sanford, Mousam River, *Philbrick 1142* (1981) (NHA).

MASSACHUSETTS. **Franklin Co.:** Deerfield, *Poland, s.n.* (1959) (MO). **Hampshire Co.:** Amherst, Connecticut River, *Jesup, s.n.* (unknown date) (NHA); Belchertown, Jabish Brook, *Thies, Thies, Thies and Seymour 5521* (1940) (WIS (2)); Mt. Holyoke, Connecticut River, *Jesup, s.n.* (1874) (MASS, HNH); South Hadley, Stony Brook, *Ahles 84604* (1977) (MASS); Southhampton, unknown collector, *s.n.* (unknown date) (MO). **Middlesex Co.:** South Natick, Charles River,

*Faxon, s.n.* (1883) (GH, MASS, MIN, NEBC (2), US); South Natick, Charles River, *Philbrick 1124* (1981) (NHA).

MISSISSIPPI. **Clarke Co.:** 2 mi. N of Enterprise, Chunky River, Dunn's Fall, *McDaniel 23005* (1979) (NO, VDB, TENN). **Covington Co.:** N of Sumrall, Bowie River, *Barnes 658* (1976) (VDB). **Lauderdale Co.:** E of Chunky, Chunky River, *McDaniel and Clark 14602* (1970) (GA). **Marion Co.:** E of Sandy Hook, Pearl River, *Suttkus 2537* (1955) (NO). **Pike Co.:** between Pricodale and Hulmerville, Topisaw Creek, *Robers 7916* (1972) (NCU, NLU, TENN, USF, VDB). **Simpson Co.:** 8 mi. SW of Pinola, Strong River, *Wallus, s.n.* (1971) (FLAS, NLU, USF). **Tishomingo Co.:** Tishomingo State Park, Bear Creek, *Pollen 65351* (1965) (NCU); Bear Creek, *Rogers 45866* (1978) (TENN).

NEW HAMPSHIRE. **Belknap Co.:** Barnstead, Suncook River, *Krochmal 1496* (1948) (NHA). **Carroll Co.:** Effingham-Freedom line, Ossipee River, *Philbrick 1134* (1981) (NHA). **Coos Co.:** N of Lancaster, "Pothole", *Krochmal 1420* (1948) (NHA). **Hillsboro Co.:** Antrim, North Branch Brook, *Krochmal and Dole 1040* (1947) (NEBC, NHA); Hillsboro, Beard's Brook, *Krochmal and Dole 1015* (1947) (NHA); Hillsborough, Beard's Brook, *Philbrick 1099* (1981) (NHA). **Merrimack Co.:** Boscawen, Contoocook River, *Philbrick 1100* (1981) (NHA); Henniker, Contoocook River, *Philbrick 1150* (1981) (NHA); Hopkington, Contoocook River, *Philbrick 1152* (1981) (NHA). **Rockingham Co.:** Epping, Lamprey River, *Philbrick 1111* (1981) (NHA); Raymond, Lamprey River, *Philbrick 1109* (1981) (NHA). **Strafford Co.:** Barrington, Isinglass River, *Philbrick 1119* (1981) (NHA); Dover, Witcher's Falls, Cocheco River, *Hodgdon 19546* (1972) (MASS, NHA); Dover, Witcher's Falls, Cocheco River, *Hellquist 2029* (1973) (WVA); Durham, Packer's Falls, Lamprey River, *Philbrick 1102* (1981) (NHA). **Sullivan Co.:** Plainfield, Connecticut River, *Zika 4433* (1981) (VT).

NEW JERSEY. **Cape May Co.:** Bennett, *Stone 15713* (1917) (PH); Stockton, *Fisher, s.n.* (1895) (PH). **Hunterdon Co.:** 2 mi. above Wallpack Bend, Delaware River, *Edwards, s.n.* (1947) (NY); Princeton, Pretty Brook, unknown collector, *s.n.* (unknown date) (NY); near Phillipsburg, Delaware River, *Porter, s.n.* (1870) (US). **Sussex Co.:** opposite Bushkill, Delaware River, *Bartram, s.n.* (1917) (PH). **Warren Co.:** Foul River, *Van Pelt, s.n.* (1907) (PH); Marble Hill, Delaware River, *Porter 1379* (1869) (PH).

NEW YORK. **Franklin Co.:** Hogansburg, St. Regis River, *Muenschner, Bassett and Maguire 1197* (1930) (F, MIN, MO, US, WIS). **St. Lawrence Co.:** rapids below Messena, Grasse River, *Muenschner, Bassett and Maguire 1198* (1930) (F, GH, HNH, MIN, MO, US, WIS); Hogansburg, St. Regis River, *Muenschner and Justice 839* (1938) (CONN, F, FLAS, MAINE, MASS, MICH, MIN, MO, NCSC, NCU (2), NHA, NY, OKLA, PH (2), US, VT). **Ulster Co.:** Glenerie Falls, *Wilson, s.n.* (1916) (NY (3)); Shawangunk Kill, *Wilson, s.n.* (1922) (NY).

NORTH CAROLINA. **Alexander Co.:** 7 mi. SW of Taylorsville, Middle Little River, *Radford 18147* (1956) (NCU); Millersville, Glade Creek, *Beal 5870* (1960) (NCSC). **Alleghany Co.:** 1.6 mi. N of Amelia, New River, *Radford 44194* (1961) (MASS, NCU, UARK, UNA, WIS). **Ash Co.:** 2 mi. SE of Scottsville, Cranberry Creek, *Beal 6064* (1961) (NCSC). **Avery Co.:** 3.4 mi. E of Grandmother Gap, Wilson Creek, *Ahles and Duke 49578* (1958) (NCU). **Buncombe Co.:** at Batcave, near Rt. 9, Flat Crick Falls, *Radford 4867* (1949) (NCU). **Burke Co.:** High Shoals, *Smith 305* (1975) (NCSC). **Caldwell Co.:** stream at Collettsville *Radford and Radford 6251* (1952) (GH, NCU); N of Patterson, Buffalo Creek, *Beal 7126* (1961) (NCSC). **Chatham Co.:** confluence of Deep and Rocky Rivers, *Beard 1302* (1956) (NCU); near U.S. 15-501, Rocky River, *Radford 44620* (1963) (NCU). **Durham Co.:** 1.7 mi. N of Weaver, Eno River, *Ahles and Bozeman 57977* (1963) (NCU); N of Bragtown, Eno River, *Radford 7371* (1953) (GA, GH, NCU, NHA, NLU, NCSC (2), US); 5 mi. N of Durham, near Christian's Mill, *Blomquist, s.n.* (1953) (DUKE); Chapel Hill, Ballings Creek, *Coker, s.n.* (1929) (NCU). **Edgecombe Co.:** NE of Rocky Mount, Tar River, *Fox and Whitford 17403* (1948) (GH, NCSC). **Franklin Co.:** 2 mi. E of Bunn, Tar River, *Beal 5685* (1960) (NCSC). **Graham Co.:** 0.7 mi SE of Tapoca, Cheoah River, *Radford 11909* (1956) (NCU). **Granville Co.:** 2 mi. SE of Berea, Tar River, *Radford and Ahles 11540* (1956) (MASS, NCU); 3.7 mi. N of Wilton on Dickerson Rd., Tar River, *Ahles and Radford 11514* (1956) (GA, NY, VDB). **Harnett Co.:** SW of Kipling, Hector Creek, *Beal 4323* (1958) (NCSC). **Haywood Co.:** Big Calocoochee River, *Bold, s.n.* (1939) (NCU); near junction of Pigeon River, Fines Creek, *Ahles and Duke 50409* (1958) (NCU); S of Watertown, Pisgah National Forest, *Thomas 31762* (1972) (NLU, SMU (2), TENN); Rt. 40, Fines Creek, *Boufford and Wood 16469* (1975) (NCU). **Johnston Co.:** E of Clayton, Neuse River, *Whitford, s.n.* (1959) (NCSC). **Lee Co.:** N of Comnock, Deep

River, *Whitford, s.n.* (1958) (NCSC). **Macon Co.:** 3 mi. N of Aquore Dam, Nantahala River, *Beal 7202* (1961) (NCSC); SE of Nantahala, Nantahala River, *Radford 5252* (1950) (NCU); 1 mi. S of Gneiss, below falls, Crow Creek, *Clausen and Kezer 5620* (1941) (NY). **Madison Co.:** 1.3 mi. W of Whiterockon, NC 212, *Ahles and Duke 50671* (1958) (FLAS, NCU); 1.0 mi. S of Hot Springs, Spring Creek, *Radford and Radford 7409* (1953) (NCU). **Mitchell Co.:** NW of Toecane, Master's Mill, *Beal 2159* (1961) (NCSC). **Nash Co.:** 1 mi. N of Strickland Cross Road, Tar River, *Beal 4159* (1958) (NCSC); 3.1 mi. NE of Red Oak, Swift Creek, *Beal 4156* (1958) (NCSC). **Orange Co.:** Rt. 70, Eno River, *Ahles and Haesloop 53240* (1960) (LAF, MAINE, MIN, NCU, TENN, VPI, WVA); Pleasant Green Road, Eno River, *Boufford 15073* (1974) (CM, MO, NHA); Duke Forest, New Hope Creek, *Wilbur 17941* (1974) (DUKE); Carrboro, Morgan's Creek, *Hueske, s.n.* (1947) (NCU). **Person Co.:** fast flowing stream, *Hall 15032* (1940) (NY, SMU). **Polk Co.:** N of junction with Green River, Pulliam Creek, *DuMond 1771* (1973) (NCSC). **Richmond Co.:** Rt. 73, below bridge, *Beal 4250* (1958) (NCSC); Mountain Creek, *Whitford and Schumacker, s.n.* (1958) (NCSC). **Rockingham Co.:** 1 mi. E of old NC 14, *Beal 7090* (1961) (NCSC). **Rutherford Co.:** Chimney Rock, Hickory Nut Creek, unknown collector, *s.n.* (1958) (NCSC). **Stanly Co.:** NE of Oakboro, Big Bear Creek, *Ahles and Leisner 16276* (1956) (FLAS, NCU). **Swain Co.:** 1 mi. N of Lauada, Alaska Creek, *Beal 7205* (1961) (DUKE, NCSC). **Transylvania Co.:** Lower Bearcamp Creek, *Rogers and Shake 62129B* (1962) (DUKE); Bearwallow Creek, *Pyron and McVaugh 791* (1936) (GA); N of Broad, Davidson River, *Beal 5796* (1960) (NCSC); Toxaway Creek, *Hardin 2039* (1960) (NCSC). **Wake Co.:** near Rolesville, granite outcrops, *Deloach and Dukes 36* (1961) (NCSC); NW of Zebulon, Mitchell's Mill, *Blomquist, Channell and Ebert 16754* (1955) (DUKE); at falls, Neuse River, *Massey and Leonard 3260* (1972) (MO, NCU (2), NHA); NE of Rolesville, Little River, *Radford and King 45057* (1966) (APSU, FLAS (2), GA, GH, LAF, MAINE, MICH, MIN, NCU, NY, OKLA, SMU, TENN, US, VDB, VPI, WIS (2), WVA). **Watauga Co.:** 2 mi. E of Boone, south fork New River, *Beal 5958* (1962) (NCSC); S of Boone, Watauga River, *Whitford and Schumacker, s.n.* (1959) (NCSC); 2.4 mi. SW of Todd, New River, *Ahles and Duke 47719* (1958) (NCU). **Wilkes Co.:** Moravian Falls, Moravian River, *Beal 5966* (1962) (NCSC); 1.5 mi. W of Maple

Springs, *Beal 5962* (1961) (NCSC). **Yancey Co.:** 2 mi. E of Bald Creek, Cane River, *Beal 2139* (1961) (NCSC); 2.3 mi. W of Ramsayton, *Ahles and Duke 50784* (1958) (NCU).

OKLAHOMA. **McCurtain Co.:** 9.0 mi. SE of Bethel, Mountain Fork River, near Ward Creek, *Hellquist 14977* (1981) (NHA); Game Preserve, Mountain Fork River, *Love 212* (1966) (OKLA); 6 mi. S of Smithville, Mountain Fork River, *Correll and Mitchell 34387* (1967) (GH, LAF, MICH, NCU, NY, OKLA, US); S of Battiest, Glover River, *Taylor and Taylor 9732* (1972) (MIN, OKLA, SMU); 31 mi. E of Antlers, Little River, *Waterfall 17217* (1966) (GH, MICH, OKLA (2)).

PENNSYLVANIA. **Allegheny Co.:** Buttermilk Falls, *Britton, s.n.* (1898) (CM). **Bedford Co.:** 1 1/8 mi. S of Hyndman, rocky stream, *Berkheimer 21735A* (1962) (CM, PH); 1 7/8 mi. SE of Fishertown, rocky stream, *Berkheimer 12243* (1951) (CM, PH). **Berks Co.:** 0.25 mi. SW of Gibraltar, Allegheny Creek, *Brumbach 670-33* (1933) (FLAS, GH, PH). **Bucks Co.:** Norrisville, *Burk, s.n.* (1872) (PH); Monroe, Delaware River, *Rutt, s.n.* (1885) (PH); 2 mi. NW of Point Pleasant, Tinicum Creek, *Proctor 2671* (1947) (PH). **Chester Co.:** Brinton's Bridge, Brandywine Creek, *Pennell 5109* (1913) (PH (2)); near Downington, Brandywine Creek, *Burk, s.n.* (unknown date) (PH); 1.75 mi. SW of Slonaker, French Creek, *Wherry, s.n.* (1951) (PH (2)). **Cumberland Co.:** 0.5 mi. SE of Williams Grove, Yellow Britches Creek, *Wahl, Potter and Browning 21566* (1965) (LAF (2), PH); Brandtsville, Yellow Britches Creek, *Philbrick 1166* (1982) (NHA). **Delaware Co.:** Chester Heights, West Branch of Chester Creek, *Pennell and Adams 591* (1926) (GH, MO, PH (2)); near Bridge-water Station, Chester Creek, unknown collector, *s.n.* (unknown date) (PH). **Fulton Co.:** SW of New Grenada, Sideling Hill Creek, *Wherry, s.n.* (1941) (PH). **Lehigh Co.:** Bethlehem, LeHigh River, *Wolle, s.n.* (1838) (CM). **Mercer Co.:** 1.5 mi. W of Mercer, Shenango River, *Shelar, s.n.* (1898) (PH). **Monroe Co.:** near Stroudsburgh, Buttermilk Falls, *Bicknell, s.n.* (1898) (PH); 1 mi. W of Shawnee on Delaware, stream joining with Marshall's Creek, *Glowneke, s.n.* (1936) (PH); W of Dupue Island, Shawnee on Delaware, Delaware River, *Glowneke 4219* (1940) (PH); Water Gap, Delaware River, *Bicknell, s.n.* (1898) (NY, PH); Slippery rock, Tobykanna Creek, *Greene, s.n.* (1858) (PH); below Marshall's Creek, in stream joining Marshall's Creek, *Glowneke 19* (1936) (NY). **Montour Co.:** 6 mi. SE

of Danville, Roaring Creek, *Adams 5897* (1940) (NCU, PH). **Northampton Co.:** Easton, Delaware River, *Burk, s.n.* (1872) (PH (2)); Martin's Creek, *Williamson, s.n.* (unknown date) (NY); east of island, above Martin's Creek, Delaware River, *Van Pelt, s.n.* (1906) (PH). **Perry Co.:** 1.25 mi. NNW of Newport, Buffalo Creek, *Myrtle and Adams 9676* (1970) (PH); 1.0 mi. WNW of Drumgold, Sherman Creek, *Myrtle and Adams 41-2* (1944) (NCU, PH). **Philadelphia Co.:** Byberry, *Martindale, s.n.* (1865) (PH); Rhawn St. Falls, Pennypack Creek, *Hand, s.n.* (1939) (PH). **Pike Co.:** 1.5 mi. S of Dingman's Ferry, Delaware River, *Wahl, O'Neil and Hazzard 19355* (1959) (NCU); High Falls, Dingman's Creek, *Brown and Saunders, s.n.* (1899) (PH); 0.75 mi. NNW of Parker's Glenn, Delaware River, *Wahl, O'Neil and Hazzard 19319* (1959) (PH); Sawkill Falls, *Nash, s.n.* (1909) (NY); near Bushkill, Winona Falls, *Fassett and Calvert 19488* (1938) (GH, MO, MSU, WIS). **Snyder Co.:** N of Beavertown, Middle Creek, *Hotchkiss 7878* (1963) (US). **Tioga Co.:** 1.0 mi. WNW of Tiadaghton, Pine Creek, *Wahl 15844* (1955) (GH, MAINE, NCU, PH); 1.25 mi. S of Ansonia, Pine Creek, *Wahl 17744* (1956) (LAF, PH). **Union Co.:** 5 mi. W of White Deer, White Deer Creek, *Roberts 3167* (1972) (OS, PH). **Venango Co.:** 2.5 mi. NW of Utica, French Creek, *Wahl 18085* (1956) (PH). **Warren Co.:** Warren, Allegheny Creek, *Witz, s.n.* (1930) (CM). **Wayne Co.:** 0.25 mi. below Hancock Bridge, Buckingham Turnpike, west branch of Delaware River, *Dix 560* (1942) (PH); 2.5 mi. SE of Balls Eddy, west branch Delaware River, *Dix, s.n.* (1946) (PH); 1 mi. NE of Equinunk, Delaware River, *Wahl, O'Neil and Regan 19276* (1959) (PH); 3 mi. NNE of Damascus, Delaware River, *Wahl, O'Neil and Regan 19307* (1959) (PH). **York Co.:** 0.75 mi. SSE of Long Level, Fishing Creek, *Moul 10108* (1949) (CM, PH).

RHODE ISLAND. **Providence Co.:** Georgiaville [Smithfield], Woonasquatucket River, unknown collector, *s.n.* (1894) (NEBC); East Providence, Hunt's Mill, Ten Mile River, *Collins, s.n.* (1893) (F, CONN (3), MO, NHA, PH, US).

SOUTH CAROLINA. **Anderson Co.:** Big Generostee Creek, Weems Creek, *Thomas 501A* (1975) (CLEMS); W of Anderson, Tugaloo River, *Radford 18001* (1956) (NCU). **Lancaster Co.:** ENE of Kershaw, S.C. Rt. 265, Lynches River, *Ahles and Haesloop 31313* (1957) (CM, MICH, OKLA, SMU). **Laurens Co.:** state highway 101, Durbin Creek, *Freeman 56921* (1956) (NCU). **Oconee Co.:** S.C. Rt. 59, Beaverdam

Creek, *Kral, s.n.* (1969) (CLEMS); above Westminster, Brasstown Creek, *Taylor 31* (1978) (CLEMS); 3 mi. from S.C. Rt. 11 and 95, behind Station Falls, *Ferguson 51* (1975) (CLEMS); NNE of confluence of Brasstown and Little Brasstown Creeks, *Boufford, Massey and Katz 16990* (1975) (NCU); 0.8 mi. S of North Carolina state line, Thompson River, *Ware and White 3315* (1970) (VDB). **Richland Co.:** I-126, at Candi Lane, Saluda River, *Crow 3274* (1980) (NHA). **Union Co.:** Rt. 49, Fairforest Creek, *Freeman 56631* (1956) (NCU). **York Co.:** E of Clover, Dan Creek, *Ahles 34652* (1957) (NCU).

TENNESSEE. **Blount Co.:** below Cove Creek, Abrams Creek, *Hubbs 19721* (1937) (MICH); 0.1 mi. below Ellejoy Creek, Little River, *Dennis, Nakosteen, Farmer, Comiskey, McNeilus and Patrick, s.n.* (1979) (TENN); 1.5 mi. N of Rocky Branch, Little River, *Webb, s.n.* (1975) (NCSC, TENN). **Bradley-McMinn Co.:** near Patty Branch, Hiawassee River, *Dennis and Wofford, s.n.* (1978) (TENN, TVA). **Cocke Co.:** Wolf Creek, *Sohmer 32477* (1963) (TENN). **Coffee Co.:** near Tullahoma, Rutledge Falls, *Sharp and Clebrch 4724* (1947) (TENN). **Davidson Co.:** Couchville Pike, Stones River, *Edwards, s.n.* (1954) (VDB). **Greene Co.:** Paint Rock, *Redfield 7669* (1876) (MO). **Grundy Co.:** below Altamount, Falls of Collins River, *Svenson 9398* (1938) (GH, PH, SMU, TENN). **Johnson Co.:** Shady Valley, Beaverdam Creek, *Webb and Webb 47150* (1976) (TENN, VDB). **Knox Co.:** E of Knoxville, French Broad River, *Wofford, Holton and Dennis 79-162* (1979) (TENN). **Lauderdale Co.:** Cypress Creek, *Hall, s.n.* (1964) (TVA, UNA). **Lewis Co.:** 7 mi. SE of Hokenwald, *Webb and Price 3091* (1980) (TENN, TVA). **Lincoln Co.:** 5 mi. S of Mulberry, Elk River, *Webb and Price 3167* (1980) (TENN). **Loudon Co.:** between Tolivar and Davis Islands, Little Tennessee River, *Wofford, Dennis and Bates 78-128* (TENN, VDB). **Maury Co.:** W of confluence with Fountain Creek, Duck River, *Webb and Dennis 1696* (1978) (TENN, TVA, VDB). **Monroe Co.:** 6 mi. up stream of Ballplay Park (Sloan Bridge), Tellico River, *Webb and Price 3537* (1980) (TENN, TVA); 0.5 mi. past Doublecamp Creek, campground, Citico Creek, *Malter, s.n.* (1977) (TENN); Rose Island, Little Tennessee River, *Bates, s.n.* (1976) (TVA). **Morgan Co.:** Montgomery Bridge, Emory River, *Robinson, s.n.* (1935) (TENN); NW of Hatfield Mountain, Obed River, *Patrick and Schmalzer 3125* (1981) (TENN). **Perry Co.:** Slink Shoals Ford, Buffalo River, *Webb 4341* (1981) (TENN).

**Polk Co.:** below Farmer, Rt. 68, Hiawassee River, *Rogers and Bowers 43923* (1969) (TENN, VDB). **Sevier Co.:** West Fork of Little Pigeon River, *Hubbs 19720* (1937) (MICH); Sevierville, Pigeon River, *Svenson 4007* (1930) (F, PH); W of Gatlinburg, Rt. 73, Little River, *Steyermark 65842* (1948) (F). **Swain Co.:** Greak Smokey Mountains National Park, *Ravensford, Barksdale and Tenneson 3109* (1936) (TENN). **Van Buren Co.:** Rockhouse Falls, Cane Creek, *Norris and Sharp 1022* (1951) (DUKE, FLAS, GA, MO, NCSC, NCU, NY, SMU, TENN, UNA, US, WVA). **Wayne Co.:** 10 mi. N of Waynesboro, Rt. 13, Buffalo River, *Webb and Price 1320* (1978) (TENN).

VERMONT. **Chittenden Co.:** South Burlington, Winooski River, *Cook and Barrington, s.n.* (1977) (VT). **Windham Co.:** Jamaica, West River, *Dobbins, s.n.* (1907) (GH). **Windsor Co.:** Woodstock, "Winslow", *s.n.* 1910 (US).

VIRGINIA. **Bedford Co.:** unknown locality, *Curtis, s.n.* (1872) (F, GH, MASS, MIN, OS, US). **Fairfax Co.:** 2 mi. SW of Garfield, Accotink Creek, *Fosberg 18655* (1942) (NO, PH). **Giles Co.:** Pembroke, at Castle Rock, New River, *Wilson, s.n.* (1972) (VPI); near Berton, New River, *Musselman and Musselman 2885* (1969) (SMU, WIS); 1 mi. S of Egelston, New River, *Marx 2640* (1974) (NLU). **Loudoun Co.:** N of Neersville, Rt. 340, Potomac River, *Ahles and James 61739* (1965) (NCU). **Montgomery Co.:** below Radford Arsenal, New River, *Whitehurst, s.n.* (1972) (VPI). **Prince William Co.:** below Beverley Mill, Broad River, *Allard 8152* (1940) (GH, VPI). **Stafford Co.:** Rt. 1 near Fredericksburg, Rappahannock River, *Webb and Webb 51843* (1976) (TENN, VDB).

WEST VIRGINIA. **Cabell Co.:** 3 mi. above Salt lick, Guyandott River, *Berkeley 431* (1930) (MO). **Calhoun Co.:** below Annamoriah Ferry, *Bartholomew, s.n.* (1944) (FLAS, LSU, NCU, UNA). **Fayette Co.:** 0.25 mi. above mouth of Dowdy Creek, New River, *Grafton, s.n.* (1976) (MIN); near Wardensville, Cacapon River, *Berkeley 1574* (1930) (MO). **Greenbrier Co.:** Alderson, Greenbrier River, *White 1014* (1976) (WVA). **Hampshire Co.:** New Creek, *Smith, s.n.* (1880) (US). **Kanawha Co.:** Upper Falls, Coal River, *Strausbaugh, s.n.* (1931) (WVA). **Lincoln Co.:** near Miller School, unknown collector, *s.n.* (1829) (WVA (2)). **Pocahontas Co.:** Seebert, Greenbrier River, *White 1045* (1976) (WVA). **Raleigh Co.:** Sandstone Falls, New River Gorge, *Grafton and McGraw, s.n.* (1974) (WVA). **Wirt Co.:** shoals below Twelve Pole Creek Bridge, *Plymale 620* (1938) (GH, WVA); 3



mi. above Creston, at mouth of Two Run, Kanawha River, *Bartholomew W1226* (1942) (WVA (2)). **Wyoming Co.:** below Baileysville, Guyandott River, *Morris 1210* (1900) (F, TENN, US).

DOMINICAN REPUBLIC. **Prov. Santiago:** Distr. San José de las Matas, Rio Magua, *Valeur 130* (1931) (F, MO).

HONDURAS. **Dept. of Comayagua:** vicinity of Siguatepeque, *Standley 56071* (1928) (F, US (2)); Siguatepeque, *Rodriguez 2671* (1945) (F).